WHAT IS CLAIMED IS:

1. An optical element comprising: a substrate having or not having a channel for optical waveguide; and a material which has a refractive index higher than that of said substrate and is filled in said channel for optical waveguide or is disposed on said substrate; wherein

the refractive index in a part of said material varies substantially periodically or is substantially continuously monotone increasing or decreasing in the direction of light propagation.

2. An optical element according to Claim 1, the refractive index in a part of said material varies substantially periodically or is substantially continuously monotone increasing or decreasing in the direction substantially perpendicular to said direction of light propagation.

3. An optical element comprising: a substrate having or not having a channel for optical waveguide; and a material which has a refractive index higher than that of said substrate and is filled in said channel for optical waveguide or is disposed on said substrate; wherein

the refractive index in a part of said material varies substantially periodically or is substantially continuously monotone increasing or decreasing in a direction substantially perpendicular to the direction of light propagation.

4. An optical element comprising: a substrate having or not

having a channel for optical waveguide; and a resin which has a refractive index higher than that of said substrate and is filled in said channel for optical waveguide or is disposed on said substrate; wherein

the refractive index in a part of said resin varies in the direction of light propagation and/or in a direction substantially perpendicular to said direction of light propagation.

5. An optical element according to Claim 4, said part of resin the refractive index of which varies is formed using the photo-hardening or thermo-hardening property of said resin.

6. An optical element comprising: a substrate having or not having a channel for optical waveguide; and a material which has a refractive index higher than that of said substrate and is filled in said channel for optical waveguide or is disposed on said substrate; wherein

said optical element further comprises temperature controlling elements disposed on said material and for partially changing the temperature of said material in the direction of light propagation and/or in a direction substantially perpendicular to said direction of light propagation.

7. An optical element comprising: a substrate having or not having a channel for optical waveguide; and a material which has a refractive index higher than that of said substrate and is filled in said channel for optical waveguide or is disposed

on said substrate; wherein

said optical element further comprises electrodes disposed on said material and for partially changing the electric field in said material in the direction of light propagation and/or in a direction substantially perpendicular to said direction of light propagation.

8. An optical element comprising: a substrate having or not having a channel for optical waveguide; and a material which has a refractive index higher than that of said substrate and is filled in said channel for optical waveguide or is disposed on said substrate; wherein

said optical element further comprises a part where said material protrudes to the direction of said substrate and/or a part where said substrate protrudes to the direction of said material, in the direction of light propagation and/or in a direction substantially perpendicular to said direction of light propagation.

9. An optical element according to Claim 8, wherein said protruding parts are provided substantially periodically.

10. An optical element according to any one of Claims 1, 2, 3, 6, 7, 8, and 9, wherein said material is composed of glass material or resin.

11. In a method of fabrication of optical element, wherein photo-hardening resin is formed in a substrate, and wherein light is irradiated onto said photo-hardening resin, thereby hardening

said photo-hardening resin, a method of fabrication of optical element wherein the amount of said light irradiated onto the surface of said photo-hardening resin is varied.

12. A method of fabrication of optical element according to Claim 11, wherein the amount of said light irradiation is varied substantially periodically or is substantially continuously monotone increasing or decreasing, in a predetermined direction on the surface of said photo-hardening resin.

13. A method of fabrication of optical element according to Claim 11 or 12, wherein the intensity of said light irradiation onto said photo-hardening resin is varied, whereby the amount of said light irradiation onto the surface of said photo-hardening resin is varied.

14. A method of fabrication of optical element according to Claim 13, wherein a mask having partially different light transmissivity is used, whereby the intensity of said light irradiation onto the surface of said photo-hardening resin is varied.

15. A method of fabrication of optical element according to Claim 11 or 12, wherein a light shielding plate is used so as to sequentially change the region irradiated by said light, whereby the amount of said light irradiation onto is varied.

16. In a method of fabrication of optical element, wherein photo-hardening resin is formed in a substrate, and wherein light is irradiated onto said photo-hardening resin, thereby hardening

said photo-hardening resin, a method of fabrication of optical element, wherein another optical component is connected to said photo-hardening resin, and then said photo-hardening resin is hardened, whereby said optical component is fixed to said photo-hardening resin.

17. A method of fabrication of an optical element according to any one of Claims 1 to 7, wherein said channel for optical waveguide in said substrate is formed in a integrated manner using a mold having protrusion and recess in the surface thereof.

18. A method of fabrication of an optical element according to Claim 8 or 9, wherein the protrusion and recess in said substrate of said optical element is formed in a integrated manner using a mold having protrusion and recess in the surface thereof.